

CLAIMS

What is claimed is:

1. A method of driving a liquid crystal display apparatus, which includes a liquid crystal display panel having data electrode lines allocated for three colors and scan electrode lines crossing the data electrode lines and a lighting device installed in the back of the liquid crystal display panel to sequentially generate back lights having different colors, so that a unit driving period is divided into first, second, and third color driving periods, the method comprising sequentially applying a single scan pulse to the scan electrode lines during a two-color driving period, in which the two color driving periods among the three color driving periods are combined and two colors are activated while the single scan pulse is applied to the scan electrode lines.

2. The method of claim 1, wherein the first, second, and third color driving periods are red, green, and blue driving subfields, respectively.

3. A liquid crystal display apparatus, comprising:
a liquid crystal display panel having data electrode lines allocated for three colors and scan electrode lines crossing the data electrode lines; and
a lighting device installed in the back of the liquid crystal display panel to sequentially generate back lights having different colors, so that a unit driving period is divided into first, second, and third color driving periods,
wherein the liquid crystal display apparatus sequentially applies a single scan pulse to the scan electrode lines during a two-color driving period, in which two color driving periods among the three color driving periods are combined, and activates two colors while the single scan pulse is applied to the scan electrode lines.

4. The liquid crystal display apparatus of claim 3, wherein the first, second, and third color driving periods are red, green, and blue driving subfields, respectively.

5. The liquid crystal display apparatus of claim 3, further comprising a two-color spectrum shutter which is installed in front of the liquid crystal display panel and allows only front lights having fourth and fifth colors, to be incident onto the liquid crystal display panel, wherein the lighting device generates back lights having sixth and seventh colors, so that lights having the first through third colors, are output through selected cells of the liquid crystal display panel and the two-color spectrum shutter by combining two among the fourth through seventh colors.

6. The liquid crystal display apparatus of claim 5, wherein when the second and third color driving periods are combined, only front light having the fourth color and back light having the sixth color are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during the first color driving period, only front light having the fifth color and back light having the sixth color are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the second color driving period while the single scan pulse is applied, and only front light having the fifth color and back light having the seventh color are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the third color driving period while the single scan pulse is applied.

7. The liquid crystal display apparatus of claim 5, wherein color of the two-color spectrum shutter changes according to an applied voltage.

8. The liquid crystal display apparatus of claim 7, wherein the two-color spectrum shutter is implemented by photonic ink.

9. The liquid crystal display apparatus of claim 5, wherein the first, second, and third color driving periods are red, green, and blue driving subfields, respectively.

10. The liquid crystal display apparatus of claim 9, wherein when the second and third color driving periods are combined, only red front light and yellow back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during the first color driving period, only cyan front light and yellow back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the second color driving period while the single scan pulse is applied, and only cyan front light and blue back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the third color driving period while the single scan pulse is applied.

11. The liquid crystal display apparatus of claim 10, wherein the two-color spectrum shutter comprises:

- a first liquid crystal panel which outputs light in a yellow wavelength to the liquid crystal display panel at a predetermined driving voltage;

- a second liquid crystal panel which outputs light in a cyan wavelength to the liquid crystal display panel at the predetermined driving voltage; and

- a third liquid crystal panel which outputs light in a magenta wavelength to the liquid crystal display panel at the predetermined driving voltage.

12. The liquid crystal display apparatus of claim 11, wherein the predetermined driving voltage is applied only to the first and third liquid crystal panels during the first color driving period, and the predetermined driving voltage is applied only to the second liquid crystal panel during the second and third color driving periods.

13. The liquid crystal display apparatus of claim 9, wherein when the first and third color driving periods are combined, only green front light and cyan back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during the second color driving period, only magenta front light and red back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the first color driving period while the single scan pulse is applied, and only magenta front light and blue back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the third color driving period while the single scan pulse is applied.

14. The liquid crystal display apparatus of claim 13, wherein the two-color spectrum shutter comprises:

a first liquid crystal panel which outputs light in a yellow wavelength to the liquid crystal display panel at a predetermined driving voltage;

a second liquid crystal panel which outputs light in a cyan wavelength to the liquid crystal display panel at the predetermined driving voltage; and

a third liquid crystal panel which outputs light in a magenta wavelength to the liquid crystal display panel at the predetermined driving voltage.

15. The liquid crystal display apparatus of claim 14, wherein the predetermined driving voltage is applied only to the first and second liquid crystal panels during the second color driving period, and the predetermined driving voltage is applied only to the third liquid crystal panel during the first and third color driving periods.

16. The liquid crystal display apparatus of claim 9, wherein when the first and second color driving periods are combined, only blue front light and cyan back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during the third color driving period, only yellow front light and red back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the first color driving period while the single scan pulse is applied, and only yellow front light and cyan back light are output through the selected cells of the liquid crystal display panel and the two-color spectrum shutter during a time allocated to the second color driving period while the single scan pulse is applied.

17. The liquid crystal display apparatus of claim 16, wherein the two-color spectrum shutter comprises:

a first liquid crystal panel which outputs light in a yellow wavelength to the liquid crystal display panel at a predetermined driving voltage;

a second liquid crystal panel which outputs light in a cyan wavelength to the liquid crystal display panel at the predetermined driving voltage; and

a third liquid crystal panel which outputs light in a magenta wavelength to the liquid crystal display panel at the predetermined driving voltage.

18. The liquid crystal display apparatus of claim 17, wherein the predetermined driving voltage is applied only to the second and third liquid crystal panels during the third color driving period, and the predetermined driving voltage is applied only to the first liquid crystal panel during the first and second color driving periods.

19. The liquid crystal display apparatus of claim 3, wherein during the combined two-color driving period, a two-color spectrum shutter allows front lights having a same color to be incident onto the LCD panel.

20. The method of claim 1, wherein a unit frame includes four subfields so that a gray scale can be displayed using time division.

21. The method of claim 20, wherein the subfields include red driving subfields and combined green-blue driving subfields.

22. The method of claim 20, wherein the subfields include green driving subfields and combined red-blue driving subfields.

23. The method of claim 20, wherein the subfields include blue driving subfields and combined red-green driving subfields.

24. A method of stably driving a liquid crystal display apparatus by sequentially applying a single scan pulse to scan electrode lines of the liquid crystal display apparatus by combining two color driving periods amongst a first, second, and a third color driving periods, activating two colors.

25. The method of claim 24, wherein the first, second, and third color driving periods are red, green, and blue driving subfields, respectively.